

Xeco Active Power Filters XPF480V

Advanced Harmonic Mitigation and Current Balancing



Key problems stem from nonlinear loads in servers, GPUs, UPS and MEP systems:

Harmonic Distortion (THD 20-50%): GPU switching during matrix operations and tensor computations generates harmonics up to the 50th order, distorting sine waves. This overheats transformers (reducing lifespan), elevates PUE, and risks IEEE 519 non-compliance, leading to utility penalties and grid-wide distortions¹.

Low Power Factor (0.7-0.9): Reactive power imbalances from erratic loads inflate current draw, triggering up to 15% higher tariffs and reducing system capacity, costing \$10M+ annually in 500 MW sites.

Transients and Voltage Instability: Sub-cycle power ramps cause $\pm 10\%$ voltage sags/swells, exacerbated by AllReduce synchronization in distributed training. During AllReduce, GPUs drop from peak TDP to $\sim 100\text{W}$ for data aggregation, creating facility-wide transients (e.g., 60 MW equivalent faults in 500 μs). This risks server crashes, data corruption, UPS over-cycling, and downtime.

Envelope Fluctuations from GPU Surges: High-frequency transients strain PDUs, introduce EMI/RFI, and degrade power quality, impacting hardware reliability and scalability for AI workloads.

Issues Amplified in AI environments: 98% of loads are nonlinear², with synchronized clusters causing 50-100% load swings in <1 second.

Theoretical Harmonic-Free Scenarios Fail Under AI Workloads:

Perfectly Balanced Systems: Require custom PFC hardware (30-50% cost increase), static loads (impossible with GPU ramps), and overbuilt infrastructure; even advanced sites struggle below 10% THD³.

DC-Powered Centers: Eliminate AC harmonics but need costly retrofits (2-3x capex); $<3\%$ adoption⁴ due to AC-native GPUs reintroducing distortions at rectifiers (5-15% ripples).

Isolated Microgrids: Minimize external harmonics but face inverter THD (8-12%), battery over-cycling from GPU spikes, and high costs (\$100M+ for 100 MW); only 5% off-grid⁵.

¹e.g., 2025 U.S. events affecting residential areas

²Uptime Institute 2025

³per 2024 IEEE reports

⁴IDC 2025

⁵2025 DCD report

Xeco is the Next-Gen Filter Solution

Xeco licenses the Electrical Current Balancing System (ECBS) Patent # 12375324 to deliver a true industry-leading total power network optimization solution.

Uptime-first control: Sub-cycle ($<100\ \mu\text{s}$) response and $<15\ \text{ms}$ full-settling response to rapidly varying IT loads such as GPU clusters, protecting UPS rectifiers and reducing nuisance trips.

Proven PCC results: Designed to achieve IEEE-519 planning levels at the PCC and network-wide while reducing UPS input THDi and generator voltage distortion during islanding.

Generator-ready: Dedicated islanding profiles with slew-rate limits and harmonic ceilings to prevent AVR/exciter hunting validated during SAT.

Capacity unlock: Lower I^2R losses and transformer heating to release headroom on PDUs/busways, often deferring capex.

Neutral & phase balance: 3 Φ /4-wire mitigation with up to 3x neutral compensation, cutting neutral overheating risk common in server halls.

Hot-serviceable & scalable: Rack-mount 50 A modules, parallel expansion (unlimited), and field-replaceable fans for low MTTR.

Quiet & efficient: $\geq 97\%$ efficiency, $\sim 895\ \text{CFM}$ forced-air cooling, and $<60\ \text{dB(A)}$ acoustics to respect white-space noise budgets.

Open integration: Native Modbus TCP/RTU and SNMP (plus optional 4G/Wi-Fi display) for rapid DCIM/BMS onboarding and KPI export.

Security by design: Role-based access, signed firmware path, and audit-ready logs for change control.

Auditable performance: Pre/post harmonic study, commissioning reports with traces, and optional remote health monitoring.

Commercial confidence: Competitive warranty options, service SLAs, and site-specific ROI framing (downtime risk + deferred capacity + energy & demand).

Market Differentiators

Multi-Technology Approach

Combining Xeco's Power Filter technology with Xeco's Line Conditioners creates an unmatched approach to creating and maintaining the cleanest electrical network possible. Utilizing Xeco's Line Conditioner (XECO600) on the main ensures your network becomes proactive instead of reactive while stopping harmonics from entering back into the main network feed.

Patented Deployments

Implementing our patented current balancing methodology delivers a best-in-practice approach to tackling network-wide distortions—realizing the most savings and correction possible. XCT Energy and Xeco approach every project with the goal of creating a network-wide solution that encompasses the entirety of a facility's electrical network.

Custom Solutions

Filter Modifications

Xeco will fabricate its filters to meet the safety needs of any site.

Project Management

XCT Energy will manage any project from start to finish, alleviating any potential headaches for the customer. From logistics to installation to data reports; XCT Energy will provide the manpower so our clients can remain focused on their day-to-day roles.

Communications

XCT Energy provides multiple solutions for comms set up in a facility and understands the high sensitivity some customers have regarding their network. We offer a comms solution that doesn't rely on the client's network.

Market-Leading Pricing

Xeco's active power filters are priced competitively to facilitate broad adoption.

Market-Leading Warranty

Xeco and XCT Energy offer a 5 year warranty, unrivaled by any competitor.



50A, 100A-3P3W/3P4W-IP20

50 Amps / 100 Amps, 3-phase 3-wire / 3-phase 4-wire



UL 508:2024
CSA C22.2 No. 14-18
EN IEC 61000-6-2:2019
EN IEC 61000-6-4:2019

System Parameters	
System Parameters	480V
Voltage Range	Phase Voltage: 215~304Vac, Line Voltage: 372~526Vac
Nominal Frequency	50/60Hz (Range: 45Hz ~ 62.5Hz)
Parallel Quantities	Unlimited
Efficiency	≥ 97%
Wiring Configuration	3-Phase, 3-Wire / 3-Phase 4-Wire
Current Transformer	0 ~ 5,000/5
Topology	Three Level
Environment Requirements	
Altitude	≤ 1,500m, 1,500 ~ 4,000m (according to GB/T3859.2, increase every 100m derating capacity 1%)
Operation Temperature	-10°C ~ +40°C
Relative Humidity	5% to 95%, non-condensing
Protection Class	Standard: IP20 (other IP classes can be customized)
Capacity Parameters	
Capacity	50A, 100A
Harmonic Compensation Ability	>97%
Harmonic Compensation Range	2nd - 51st Harmonic Order
IGBT Frequency	20Khz
Reaction Time	<100us
Full Response Time	<15ms
Cooling	895CFM
Noise Level	<60dB
Resonance Protection	Yes
Neutral Compensation Capacity	3 Times Rating
Power Loss	<3% Rated Power
Mechanical Characteristics	
Color	Black
Installation	Rack Mounted
Dimensions (L x W x H) mm	50A: 197 x 533 x 502 100A: 254 x 501 x 736
Net Weight (KG)	50A: 32 100A: 64
Gross Weight (KG)	50A: 42 100A: 80
Communications	
Communication Port	RS485, Ethernet Port, 4G, WiFi
Communication Protocol	Modbus, TCP/IP
Monitoring	Individual Monitoring/Central Monitoring
Alarm	16 Alarm Record
Active Power Filter Cabinet Models	
Rated Compensation Current	Customized
Cabinet Dimensions	Customized
Protection Class	Customized

Always Connected. Always in Control.

All of Xeco's Active Power Filters seamlessly connect to the Xeco Energy Portal, giving you instant visibility of power quality telemetry, performance metrics, alerts, and system status.

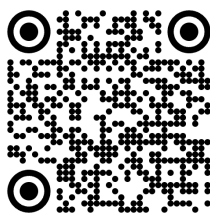
Whether on-site or remote, you stay in control. Monitor, configure, and optimize anytime anywhere.

Reduce downtime, improve efficiency, and simplify maintenance with secure access.



Remote Monitoring Made Simple.

- Automatic or manual calibration to adjust for load variations
- Real-time monitoring and diagnostics
- Historical meter data and reporting
- Multi-site management from one dashboard
- Secure, browser-based access
- Alerts and notifications for proactive maintenance
- Track day-to-day electricity cost
- Forecast monthly energy consumption
- Schedule remote on/off testing
- Monitor your entire facility's energy consumption



Talk to the team about our
Next-Gen Active Power Filters.